TITLE OF THE INVENTION

IMAGE PROCESSING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to image processing methods and printers.

2. Description of Background Art

In general, photographs of individuals contain a scene as a background. In many cases, such photographs cannot suitably be used as pictures for identification or the like as they are. Accordingly, it is conventional practice to remove the background and to print (solid printing) the resulting vacant portion with Bk (black) or the like with a uniform density.

However, when the background of a person's image or the like is subjected to solid printing, visible unevenness of printing occurs unfavorably because completely uniform solid printing cannot be effected owing to uneven ink coating on the transfer ribbon, variations in the energy applied to the thermal head, etc.

SUMMARY OF THE INVENTION

In view of the above-described problem with the conventional technique, an object of the present invention is to prevent visible unevenness of printing from occurring in the background portion of an image.

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To attain the above-described object, the present invention provides an image processing system including an image processing unit for processing input image data and an output unit for outputting an image processed in the image processing unit. The image processing unit has the function of cutting out a background portion of the image and effecting color specification and further has the function of specifying a method of processing the background portion. When printing the image, the output unit recognizes the background portion on the basis of the color specification and carries out background processing for the recognized background portion on the basis of the specified background processing method.

Preferably, the output unit converts pixels into a pattern and prints the background portion with a discontinuous pattern on the basis of the specified background processing method.

Preferably, the pattern is a stripe pattern or a dot pattern.

Preferably, the color specification specifies a uniform density of a specific color.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will

be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram illustrating the system
configuration of the present invention.

Fig. 2 is a flowchart showing host-side process flow.

Fig. 3 is a flowchart showing printer-side process
flow. *Figs. 4(a) through 4(e)* computer

~~Fig. 4 is~~ a diagram illustrating background
processing according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be
described below with reference to the accompanying
drawings.

Fig. 1 is a block diagram illustrating the system
configuration of the present invention. The image
processing system according to the present invention
includes an image processing unit 1 for processing image
data and an output unit 2. The output unit 2 includes a
display, a printer, etc. for outputting an image processed
in the image processing unit 1. Image data may be captured
with a scanner 3 connected directly to the image
processing system or with a video camera 4 connected to
the image processing system via a video terminal. It is
also possible to read image data already stored in the
form of digital data on a CD-ROM 5 or a magneto-optical
disk 6.

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Next, image processing according to the present invention will be described with reference to Figs. 2 to 4 in regard to an example in which clipping is carried out by a manual operation, and a background pattern is

5 manually synthesized, and then the processed image is outputted to a printer. Fig. 2 is a flowchart showing process flow carried out by the image processing unit of the present invention. Fig. 3 is a flowchart showing printer-side process flow. Fig. 4 is a diagram

10 illustrating background processing.

First, processing carried out by the image processing unit (host-side processing) will be described with reference to Fig. 2. A desired image previously stored in an external storage unit is displayed on a

15 display (step S1). The image is composed of R (red), G (green) and B (blue), each represented by 8 bits. On the display, the image is displayed as an image of three colors, i.e. C (cyan), M (magenta) and Y (yellow), for example, as follows:

20 C=255-R, M=255-G, Y=255-B

In general, photographs of individuals contain a scene as a background. In many cases, such photographs cannot suitably be used as pictures for identification as they are. Accordingly, as shown in part (A) of Fig. 4, a

25 person's image portion of the displayed image is cut out (i.e. the background is deleted) by using publicly known retouching software (step S2). Next, a color to be used for the deleted background portion is specified. For

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example, Bk (black) with 64 gradations is specified as shown in part (B) of Fig. 4 (step S3). Next, printer output software is started (step S4) to output the processed image to the printer. In outputting the image, a

5　background processing method (described later) is specified by the printer or output software, and information indicating the specified background processing method is transmitted to the printer (step S5). After the background processing method has been specified, Y, M, C

10　and K image data items are transferred to the printer (steps S6 to S9).

　　　Next, printer-side processing will be described with reference to Fig. 3. The printer receives the information indicating the specified background processing method

15　(step S11). The printer also receives the Y, M, C and K image data items and writes them into respective memories (steps S12 to S15). After receiving all of the image data, the printer feeds paper (step S16) and commences printing. For example, the printer reads the image data items from

20　the respective memories in field sequence, i.e. Y, M and C, to carry out printing (steps S17 to S19). At the step of carrying out printing of the K image data for the background portion, the printer reads the K image data from the associated memory and performs conversion of the

25　K image data into pattern data, writing and reading of the pattern data into and from a memory and printing of the K image data (step S20). In a case where non-processing has been specified as a background processing method, for

example, the K printing process is also effected faithfully to the image data as shown in part (B) of Fig. 4. If patterning with horizontal lines has been specified as a background processing method, the printer

5   recognizes, prior to printing, that Bk with 64 gradations has been specified in the received data, and converts pixels into a pattern. For example, each series of vertical 4 dots of 8x8=64 pixels as shown in part (D) of Fig. 4 is replaced with 1 dot with 255 gradations as shown

10 in part (E) of Fig. 4. Consequently, as shown in part (C) of Fig. 4, an image with the background replaced with horizontal lines drawn at intervals of 4 dots is outputted. If the background is reproduced as a striped discontinuous image area in this way, it is difficult to recognize

15 unevenness in printing of the stripes relative to the surroundings. Thus, unevenness of density and color can be made difficult to perceive by the eye. Stripes to be printed in the background are not necessarily limited to horizontal lines but may be vertical lines, oblique lines,

20 etc. Further, patterns to be printed in the background are not necessarily limited to stripes but may be dots or the like. By reproducing the background as a discontinuous image area using a dot or other similar pattern, it is also possible to make unevenness of density and color

25 difficult to perceive by the eye.

Although in the above-described embodiment the color for the background is specified as a single color, i.e. K, the present invention is not necessarily limited thereto.

For example, the color for the background may be specified as C=M=Y=64 gradations, and the whole image, including the background, may be handled in the form of three-color image data, i.e. C, M and Y. In this case, a portion of the image data that has a specific combination of three colors. (C, M and Y) is judged to be a background, and this portion is subjected to background processing. If ink used in the printer consists of four colors, i.e. C, M, Y and K, a portion of C=M=Y=64 gradations is judged to be a background, and this portion is replaced with K=64 gradations, for example. The replacement may be performed when the image is transferred from the host side. Alternatively, the replacement may be performed on the printer side on the basis of the received image. In this case, there is a possibility that data concerning a person's image portion may contain an area of C=M=Y=64 gradations. If this portion is replaced as in the case of the background processing, the resulting image may appear unnatural. In the case of a natural image, however, there is little probability that an area having the same combination of gradation values will be contiguously present around it. Therefore, there is a strong possibility that such replacement may be visually disregarded. Alternatively, to prevent the occurrence of the above-described problem, processing may be carried out as follows. Regarding a pixel noticed and 8 surrounding pixels, i.e. a total of 3x3 pixels, if all of the pixels have a predetermined combination of gradation values, this

area is judged to be a background. If all of the 3×3
pixels do not have a predetermined combination of
gradation values, the area is judged to be a natural image.
Only the area judged to be a background is subjected to
5   the background processing. In these cases also, data
representing K=64 gradations may be replaced with a
pattern, e.g. lines, according to the specified background
processing as in the case of the above.

In a case where ink used in the printer consists of
10 three colors, i.e. C, M and Y, data concerning the
background is replaced with K data, and this is further
replaced with a pattern. Then, the data is returned to a
combination of three colors, i.e. C, M and Y. By doing so,
a similar effect can be produced. If K=64 is replaced with
15 horizontal lines drawn at intervals of 4 dots as in the
above-described example, printing is effected with K=255.
In this case, it is possible to print the background with
a desired color while pattering it by using a desired
combination of three colors, e.g. C=255, M=200 and Y=180.
20 In this case, background processing may be carried out
directly, without performing replacement with K data, by
judging a portion of C=M=Y=64 to be a background.

In the foregoing embodiments, the present invention
has been described with regard to a case where the
25 background has a uniform density. It should be noted,
however, that gradation may be given to the background, or
a design may be put in the background. In the above-
described example, gradation can be given to the

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background by changing the gradation values of the straight lines or changing the line pitch. It is also possible to represent only the background by the dot area modulation method, for example, on the basis of 4×4 data

5   concerning the original image instead of using straight lines.

As has been stated above, according to the present invention, the background of an image is reproduced as a discontinuous image area using a pattern such as a stripe

10   pattern. Consequently, it is difficult to recognize unevenness in printing of the pattern relative to the surroundings. Thus, unevenness of density and color can be made difficult to perceive by the eye.

It should be noted that the present invention is not

15   limited to the foregoing embodiments but can be modified in a variety of ways.